APPENDIX I-1

NATURAL HISTORY INFORMATION FOR SPECIAL STATUS SPECIES FOUND IN SBCT ROI

Appendix I-1
Biological Resource Information For Special Status and Protected Species Found In SBCT ROIs

I-1A: RECOVERY PLANS

SBMR

Plant

- *Abutilon sandwicense* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Alectryon macrococcus* var. *macrococcus* (USFWS, July 29, 1997 [USFWS 1997]) Maui plant cluster;
- *Alsinidendron trinerve* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Chamaesyce rockii* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Cyanea acuminata* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *C. grimseana* ssp. *grimseana (*USFWS, July 1995 [USFWS 1995]) Wai'anae Plant Cluster;
- *C. koolauensis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *C. st-johnii* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *C. superba (*USFWS, July 1995 [USFWS 1995]) Wai'anae Plant Cluster;
- *Cyrtandra subumbellata* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Delissea subcordata* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Diellia falcata* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *D. unisora (*USFWS, July 1995 [USFWS 1995]) Wai'anae Plant Cluster;
- *Flueggea neowawraea* (USFWS, July 10, 1999 [USFWS 1999a]), Multi Island plants;
- *Gardenia mannii* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Hesperomannia arborescens* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu Plants;
- *Isodendrion laurifolium* (USFWS, July 10, 1999 [USFWS 1999a]) Multi Island Plants;
- *I. longifolium* (USFWS, July 10, 1999 [USFWS 1999a]) Multi Island Plants;
- *Labordia cyrtandrae* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Lepidium arbuscula* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Lipochaeta lobata* var. *leptophylla* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu Plants;
- *Lobelia gaudichaudii* ssp. *koolauensis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu Plants;
- *L. oahuensis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu Plants;
- *Phyllostegia hirsute, P. mollis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Phlegmariarus nutans* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu Plants;
- *Pteris lidgatei* (USFWS, April 10, 1998c [USFWS 1998c]) Four Hawaiian ferns;
- *Pritchardia kaalae* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Sanicula purpurea* (USFWS, July 10, 1999 [USFWS 1999a]) Multi Island Plants;
- *Schiedea hookeri, S. nuttallii (*USFWS, July 1995 [USFWS 1995]) Wai'anae Plant Cluster;
- *Tetramolopium lepidotum* ssp. *lepidotum* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Tetraplasandra gymnocarpa* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Urera kaalae* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants*;*
- *Viola chamissoniana* spp. *chamissoniana* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants; and
- *V. oahuensis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants.

Wildlife

- Hawaiian hoary bat, USFWS May 11, 1998 (USFWS 1998a).

DMR

Plant

- *Schiedea kealiae* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Nototrichium humile* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Hibiscus brackenridgei* (USFWS, July 10, 1999 [USFWS 1999a]) multi-island plants; and
- *Cyperus trachysanthos* (USFWS, July 10, 1999 [USFWS 1999a]) multi-island plants.

Wildlife

- Hawaiian hoary bat (USFWS, May 11, 1998 [USFWS 1998a]); and
- Hawaiian seabirds (USFWS, April 25, 1983 [USFWS 1983b]).

KTA

Plant

- *Chamaesyce rockii* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Cyanea koolauensis*, *C. longiflora*, *C. grimseana* spp. *grimseana, C. crispa, C. humboldtiana,* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Eugenia koolauensis* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Gardenia mannii* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Phyllostegia hirsuta* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants;
- *Tetraplasandra gymnocarpa* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants; and
- *Hesperomannia arborescens* (USFWS, August 10, 1998 [USFWS 1998b]) O'ahu plants.

Wildlife

- Hawaiian hoary bat, USFWS May 11, 1998 (USFWS 1998a).

PTA

Plant

- *Asplenium fragile* var. *insulare* (USFWS, April 10, 1998 [USFWS 1998c]);
- *Hedyotis coriacea* (USFWS, July 10, 1999 [USFWS 1999a]);
- *Neraudia ovata* (USFWS, August 10, 1998 [USFWS 1998b]);
- *Silene hawaiiensis* (USFWS, September 26, 1996 [USFWS 1996]);
- *S. lanceolata* (USFWS, September 26, 1996 [USFWS 1996]);
- *Spermolepis hawaiiensis* (USFWS, July 10, 1999 [USFWS 1999a]); and
- *Tetramolopium arenarium* (USFWS, September 26, 1996 [USFWS 1996]).

Wildlife

- Hawaiian hoary bat (USFWS, May 11, 1998 [USFWS 1998a]);
- Palila (USFWS, June 27, 1986 [USFWS 1986]);
- 'Akiapōlā'au (honeycreeper) (USFWS, February 3, 1983 [USFWS 1983c] Hawaiian Forest Birds, (4 spp.);

- Hawaiian goose, (USFWS, February 14, 1983 [USFWS 1983d]);
- Hawaiian hawk (USFWS, May 9, 1984 [USFWS 1984]);
- Hawaiian dark-rumped petrel (USFWS, April 25, 1983 [USFWS 1983b]) Hawaiian Seabirds.

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I-1B SPECIAL STATUS PLANTS – NATURAL HISTORY INFORMATION AND SBCT LOCATION IF KNOWN

Status Key:

FE= **Federally Listed as Endangered (ESA)**
FT= **Federally Listed as Threatened (ESA)**
FSOC= **Federally Listed as a Species of concern**
FC= **Federally Listed as a Candidate species for listing**
SE= **Hawaii state listed as endangered**
SE*= **The state endangered listing refers only to the populations on Oʻahu, Lanaʻi, and Molokaʻi**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)
G3 = Species very rare with restricted range
G4 = Species apparently globally secure
G5 = Species demonstrably globally secure
GH = Species known only from historical occurrences
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
T2 = Subspecies imperiled globally (typically 6-10 occurrences)
T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).
T4 = Subspecies apparently globally secure
+ = Federal Birds of Conservation Concern Species

Abutilon sandwicense (FE/G1). *Abutilon sandwicense* has no common Hawaiian name and grows typically in dry to moist lowland forest in gulches and sometimes on steep slopes. This perennial shrub flowers in winter and spring, and though many of the seeds sprout, few plants grow to maturity. It is a federally listed endangered species, and critical habitat has been proposed for this species on Oʻahu. Historically *Abutilon sandwicense* was known over almost the entire length of the Waiʻanae Mountain range. The 14 remaining populations all fall within a 5-by-10-mile area and number under 300 individuals. The biggest threat to this endangered species is competition from alien plants and the associated habitat degradation. Fire and trampling by feral goats pigs and cattle are also seen as threats.

- **SBMR:** It is known to exist in the South Range land Acquisition (Honouliuli Preserve) project area (USFWS 1998b).

Alectryon macrococcus* var. *macrococcus (FE/G2). This species is generally found in native moist forest in gulches and on lower gulch slopes. It was formerly widespread on leeward coasts of Kauaʻi, Molokaʻi, Maui, and Oʻahu. Now the entire subspecies totals around 500. Oʻahu populations have about 400 of these plants, at numerous sites in the Waiʻanae Mountains and rarely in the Koʻolau Mountains. The greatest threat is the black twig borer, which affects all trees of the species to varying degrees. Other threats include feral pigs and goats, which disturb habitat, and rats that prey on the seeds. Alien grasses also change the species' habitat, ultimately increasing the frequency and size of fires (Wagner et al. 1999).

- **SBMR:** Three populations exist on the SBMR, in the west range.

A. trinerve (FE/G1). This species of typically grows on slopes in wet forests at higher elevations than *A. obovatum*. These erect subshrubs flower and fruit year-round and are typically known from the southern and north-central Wai'anae Mountains. There are three known populations, with around 44 individuals among them. Current serious threats to plants include competition from aggressive alien plants, especially the prickly Florida blackberry), habitat degradation associated with feral pigs, and human interference. As with all small populations of plants, reproductive ability may be compromised (Wagner et al. 1999; USFWS 1998b).

- **SBMR*:*** Suitable habitat exists for this plant on the training area. It is known from Mount Ka'ala.

Aspleinum fragile* var. *insulare (FE/-). The fragile perennial fern grows in lava tubes and deep cracks with a moderate amount of soil or ash. In some settings it is also found in subalpine shrubland and dry forests. There are few threats to this fern, but grazed fronds have been observed.

- **PTA:** These ferns are known from Kīpuka 'Alalā, Kīpuka Kalawamauna, and in the Palila critical habitat, all within the ROI

Bobea sandwicensis (-/G2). ('ahakea)***.*** The 'ahakea tree grows in dry to moist forests, generally on gulch slopes, ridges, or old lava flows on O'ahu, Moloka'i, Lana'i, and Maui. This species can grow up to nearly 33 feet (Wagner et al. 1999).

- **DMR:** There is suitable habitat for this species on DMR.

B. timonioides (FSOC/G2) . This tree can grow to 33 feet high. It is found in dry to, occasionally, moist forest and benefits from weed removal in its habitat.

- **KTA:** There is one individual of this species known to occur at KTA.

C. olowaluana (FSOC/G2). This plant occurs as a small tree and generally live on older substrate with modest soil development. Much of its original habitat has been disturbed by wildfire, and feral animals have put significant pressure on this species. Feral sheep and goats frequently girdle the trees and push over and eat small trees and saplings.

- **PTA:** Populations are known on PTA at Kīpuka 'Alalā and Kīpuka Kalawamauna, with in the north and west of the installation. This plant occurs in the ROI.

C. rockii (FE/G1). 'Akoko is a compact shrub or small tree that is found in the wet forest and shrubland often dominated by 'ōhi'a or uluhe. Eleven of the remaining thirteen populations are found on the Kawailoa Training Area land, though this species was formerly known scattered throughout the Ko'olau Mountains. The primary threats to this species include habitat degradation and destruction by feral pigs, potential impacts from military training and competition with alien plants.

- **SBMR:** This species is known to exist within the training area.
- **KTA:** Four of the eleven remaining populations of this species are found on KTA, though this species was at one time scattered throughout the Ko'olau Mountains.

Cyanea acuminata (FE/G1), C. grimseana (FE/G1), C. koolauensis (FE/G2), C. superba (FE/-)* and *C. st-johnii (FE/G1). While each of these Cyanea species is distinct, some generalizations can be made. They generally inhabit moist to wet slopes, gulches, stream banks, or

closed canopy forests at least 670 feet and not more than 3,000 feet in elevation in the Koʻolau Mountains. All species are negatively affected by habitat destruction from feral species, such as the pig, fruit predation by slugs and rats, species competition with aggressive alien plants, trampling by hikers, and over-collection. Impacts from military training are a potential threat to these plants and their habitats. Natural events, such as hurricanes and landslides, combined with small population numbers, also put these plants at the risk of extinction.

- **SBMR:** *Cyanea* species are known to occur at SBMR.
- **KTA:** A few individuals of these species can be found within the ROI.

Cyperus trachysanthos puʻukaʻa (FE/G1). A densely clumped perennial member of the sedge family, this plant is found on wet slopes and at pond margins. Few recent collections have been made.

- **DMR:** The population of this plant at Kaʻena Point Natural Area has been extirpated, and it no longer occurs on DMR.

Cyrtandra dentata (FE/G1). This plant is found in moist to wet forests in the Waiʻanae and Koʻolau mountains, these shrubs flower and fruit throughout the year. Though little scientific information is available about its life cycle, this shrubs has been observed flowering and fruiting from May to November. The primary threats to this species are feral pigs and goats and the associated habitat degradation, competition for light, space, and nutrients with aggressive alien plants, and fruit and seed predation by slugs, snails and rats.

- **KTA:** Each species has three populations in the ROI.

C. viridiflora (FE/-). This *Cyrtandra* species is found in moist to wet forests in the Waiʻanae and Koʻolau mountain. Though little scientific information is available about its life cycle, this shrubs has been observed flowering and fruiting from May to November. The primary threats to this species are feral pigs and goats and the associated habitat degradation, competition for light, space, and nutrients with aggressive alien plants, and fruit and seed predation by slugs, snails and rats.

- **KTA:** Each species has three populations in the ROI.

C. subumbellata (FE/-). This plant is considered to be critically globally imperiled. These plants are found in moist to wet forests in the Waiʻanae and Koʻolau mountain ranges. Though little scientific information is available about their life cycles, these shrubs have been observed flowering and fruiting from May to November. The primary threats to this species are feral hoofed species and the associated habitat degradation, competition for light, space, and nutrients with aggressive alien plants, and fruit predation by slugs.

- **SBMR:** This species is known to occur in the north and central koolau mountains east of Kawailoa.

Cystopteris douglasii (FSOC/G2). This endemic fern is found in few high altitude locations on the Island of Hawai'i (Mauna Kea Master Plan, 2000). It is found in Myoporum forest and shrubland (Char 1991) and is threatened by general habitat disturbance.

- **PTA:** This plant occurs in Myoporum forest and shrubland (Char 1991) within the ROI.

Delissea subcordata (FE/G1). This is a small shrub, with few remaining plants. Suitable habitat exists for this plant on the training area and Waiʻanae Mountains. It grows in moist forest, either under tree canopy or in sunny spots. These small shrubs were historically scattered throughout the Koʻolau Mountains (mostly central and southeastern); presently only 55 plants remain. In the Waiʻanae Mountains they inhabit moist forests, either under canopy or in sunny spots. They are often found growing with *Cyanea* species.

- **SBMR:** Often found with *Cyanea* species and other *Delissea* species, this plant is known to exist on the SBMR training area in the west range.

Diellia falcata (FE/G1). *D. falcata* is a terrestrial fern that is found generally in deep shade or open understory in dry forest.

- **SBMR:** *D. falcata* is known from two sites on SBMR. . It is known to occur in the south range.

Diplazium molokaiense (FE/G1). This fern is known to occur on slopes in moist to wet forests along ridge crests and in cloudswept areas.

Dissochondrous biflorus (FSOC/G2). This tall perennial has a short, knotty underground stem. It can be found on slopes in moist forests.

Dubautia arborea (FSOC/-). This large shrub has been severely affected by feral animals. Formerly widespread on Mauna Kea, it is now only locally abundant in subalpine shrubland, woodland, and alpine desert.

- **PTA:** This species is confirmed in the western and southern portions of the range within the ROI.

D. sherffiana (FSOC/G1). This plant is a small spreading shrub that flowers from May to July on dry ridge tops This species overlaps the range of *D. herbstobate* slightly and seems to have broader range through Waiʻanae Mountains than does *D. herbstobate*. It is found mostly on wetter inland ridges. Threats from feral hoofed animals have been almost completely eliminated on ridge tops and within fenced areas, though after 20 years of impacts the habitat has degraded from alien species invasions and the threat and damage from wildfires has greatly increased. Its range spreads from coastal dry cliffs to wetter inland ridges, and it is threatened by fire.

- **SBMR:** This species is known to occur in the west range.

Eragrostis deflexa (FSOC/G1). Bent lovegrass is a perennial with small horizontal stems known historically from Hawaiʻi and Lanaʻi. It was thought to be extinct until it was recently rediscovered . This species is easily propagated and can grow on lava flows of vastly differing ages. Habitat invasion by alien plant species seems to be the greatest threat to *E. deflexa*.

- **PTA:** It was thought to be extinct until it was recently rediscovered on PTA. It is found in the PTA ROI.

Eugenia koolauensis (FE/G1). This small tree or shrub is found in moist forests and dry gulches. It commonly occurs in forests dominated by ʻōhiʻa but the populations of this plant are small and removed from each other.

- **KTA:** There are 31 individuals in ʻŌʻio, Kaunala, and Aimuu gulches in KTA.

Exocarpus gaudichaudii (FSOC/G1). Heau (Whisk broom sandalwood) is an uncommon small tree found sparsely populating moist ridges and shrublands. It grows in many types of forest communities associated with ʻōhiʼa. This rare shrub/small tree was known from Hawaiʻi, Lanaʻi, Maui, and Molokaʻi and is currently very rare on these islands. Its general substrate type is Mauna Loa pāhoehoe flows, ranging from 1,500 to 5,000 years old. Fire, though improbable in the *Metrosideros* forest, is a habitat threat (Shaw 1997) for this species.

- **SBMR:** this species is known to occur in the east range.
- **KTA:** Five populations are known within the ROI.
- **PTA:** It occurs only infrequently on PTA, in the western part of the installation, where there are estimated to be about a dozen plants.

Festuca hawaiiensis (FC/G1). Hawaiian fescue is a perennial tufted grass, and was known historically from Maui and Hawaiʻi but is now known only from the southwest portion of PTA at areas surrounding Kīpuka ʻAlalā.

- **PTA:** It is known only from the southwest portion of PTA at areas surrounding Kīpuka ʻAlalā.

Flueggea neowawraea (FE/-). Mēhamehame is a tree that can grow to almost 100 feet tall. Flowering appears to depend on weather patterns and is not necessarily synchronized. They grow in low moisture forests, though some remaining trees are mostly found on north-facing gulch slopes and bottoms. The black twig borer introduces pathogens, weakens the tree, and causes premature death. Chinese rose beetles can reduce the leaves to skeletons. Other threats include farming, ranching, development, alien plants, and feral hoofed animals.

- **SBMR:** This plant is known to exist on the training area, specifically in the western fork of Palikea Gulch in the Mount Kaʻala NAR.

Gardenia mannii (FE/G1). (nanu). These are trees up to 50 feet tall, occurring in moist to occasionally wet forests that are dominated by ʻōhiʻa, usually on moderate to steep gulch slopes. There are five known populations in the Waiʻanae Mountains. Military activity and training in the habitat area is a potential threat. Documented threats include fierce competition by alien plants (Koster's curse, prickly Florida blackberry, and strawberry guava), increased potential of destruction due to fire as a result of alien plant encroachment, and habitat disturbance. The small population size of this species increases its likelihood of extinction from reduced reproductive vigor.

- **SBMR:** This plant is known to exist in the western portion of the ROI. Specifically it is found in the Haleʻauʻau Gulch and the Honouliuli Preserve. These populations occur on land controlled by DOD for Kawailoa and Kahuku training areas and SBMR. The number of plants is fewer than 100.
- **KTA:** There are presently five known populations in the Waiʻanae Mountains, on land controlled by DOD for Kawailoa and Kahuku training areas and Schofield Barracks Military Reservation. The total number of plants is less than 100. There are three populations in the ROI, found in lower Pe'ahinai'a.

Haplostachys haplostachya (FE/G1). Hawaiian mint is a perennial subshrub is known to exist only on PTA, though it was formerly widespread on Kauaʻi, Maui, and HawaiʻI (Wagner et al 1999).

It grows almost exclusively on lava flows over 10,000 years old.. Habitat loss from encroaching fountain grass is a threat, but the primary threat is wildfire. Shaw (1997) mentions the lack of any other plants of this genus, increasing the importance of these plants.

- **PTA:** This plant occurs in the ROI.

Hedyotis coriacea (FE/G1). Kioʻele is a small erect shrub, believed to be extinct, but 31 populations have been found within the last few years. It is found in Metrosideros treeland of differing densities and understory composition (PCSU 2002). This plant is very palatable to goats and sheep and has been heavily browsed.

- **PTA:** It is known only from west PTA: Kīpuka Kalawamuauna Endangered Plants Habitat, near Charlie Circle, and near Kīpuka ʻAlalā.

H. parvula (FE/-). An erect to sprawling shrub that grows typically on exposed ridges or cliff faces, it is native to the Waiʻanae Mountains. Feral pigs and goats are a major threat. Alien plants alter the habitat, compete for valuable nutrients and light, and increase the incidence of wildfires.

Hesperomannia arborescens (FE/-). A shrubby tree scattered throughout the Koʻolau Mountains and is known from the central and southern Waiʻanae Mountains on slopes and ridges in wet forest. This species is becoming increasingly rare. The primary threats to this species include habitat degradation and destruction by feral pigs, potential impacts from military training, and competition with alien plants. An additional threat is trampling by humans, as a hiking and hunting trail runs through one of the Oʻahu population units. This species also occurs on West Maui. Current species tallies put the population on Oʻahu at a maximum of 39.

- **SBMR:** Suitable habitat exists for this plant on the training area.
- **KTA:** It is known from the central and southern Waiʻanae Mountains. Current species tallies put the population on Oʻahu at a maximum of 39. Several populations are found on ridges in the ROI.

H. sandwicensis (FC/G1). This plant is a broad leaved herbaceous annual and can be found in any of the native vegetation communities on PTA. This plant is often browsed despite its stinging hairs.

- **PTA:** It can be found in any of the native vegetation communities on PTA. It is widespread throughout the ROI.

Hibiscus brackenridgei* ssp. *mokuleianus (FE/G1) (Mokuleianus Maʻo hau hele). At the start of summer this plant goes dormant. New growth appears at the onset of the wet season. This species was previously more widespread in lowland dry areas, but habitat has been disturbed from centuries of habitation and agriculture. Primary threats include damage by the introduced Chinese rose beetle, habitat degradation, and increased threat of wildfire from encroachment of nonnative grasses.

H. brackenridgei* ssp. *mokuleianus (FE/G1). This sprawling shrub was previously more widespread in lowland dry areas, but the habitat has been changed from centuries of habitation and agriculture. With the encroachment of molasses grass, fire is becoming a more serious threat. The Mākua site has burned twice in the last 10 years, but this population survives.

- **DMR:** There is one population of two individuals just south of the DMR installation boundary.

Hibiscus kokio* spp. *kokio (FE/G2) (Koki'o 'ula 'ula). This species is a shrub or small tree found scattered through wet or dry forests. Alien plant competition poses a great threat to this species.

- **DMR:** There is one individual on the boundary of DMR and Mokulē'ia Forest Reserve.

Isodendrion hosakae (FE/-). (aupaka). This branched shrub occurs in dry shrubland generally associated with the native species of Dodonaea, Sophora, Wikstroemia and Santalum at PTA. The greatest threat to this plant is browsing by cattle.

- **PTA:** It is present on three cinder cones in the West PTA Acquisition Area within the ROI.

I. longifolium (FT/-). (aupaka). This shrub is found on steep slopes in native dominated forests that are moist to wet. Populations of these long-lived perennials are declining.

- **SBMR:** This species is found on the SBER.

I. laurifolium (FE/-). (aupaka). This plant grows on rocky cliff slopes in diverse forests that are moist to wet. Though these plants are long lived, populations are declining. Threats to this plant include feral pigs and goats and competition with alien plants.

- **SBMR:** This species is found on the SBER.

Joinvillea ascendens* spp. *ascendens (FC/G3). ('ohe). This grasslike herb can grow to 15 feet in height. It occurs on several Pacific islands and is rare in Hawai'i. It can be found infrequently along wet ridges and intermittent streams above 900 feet in elevation. Seedlings are rarely observed in Hawai'i forests and though the seeds do germinate in cultivation, the plants have not lived beyond the seedling stage. In areas of feral cattle there is extensive damage to these plants.

- **SBMR:** Suitable habitat for this plant occurs in the SBER.

Labordia cyrtandrae (FE/G1). Endemic to O'ahu, this rare shrub is found in moist valleys and forests. It grows with native plants, *Metrosideros polymorpha* and *Boehmeria grandis*. Few individuals remain, and habitat for this plant is threatened by alien plants and feral goats.

- **SBMR:** Populations of this plant are known to exist in the North Hale'au'au and North Mohiākea gulches of the SBMR training area. Also from Mount Ka'ala, and the western portion of SBMR.

L. kaalae (FC/G1). (kāmakahala). This shrub or small tree occurs on wet ridges in the Wai'anae Mountain range.

- **SBMR:** Habitat for this species occurs in the training area.

Lepidium arbuscula (FE/G1). This plant is commonly found in the Wai'anae Mountains on exposed ridges and cliffs.

- **SBMR:** There are two populations of this species on the training area.

L. bidentatum* var. *o-waihiense (FSOC/-). ('ānaunau, naunau, kūnānā). This subshrub has weakly erect stems and is widely distributed on coastal sites at low elevations and on steep dry rocky coastal slopes.

- **DMR:** Suitable habitat exists for this species on DMR.

Lipochaeta lobata* var. *leptophylla (FE/G2). (nehe). This perennial herb can be found in dry coastal habitats and occasionally in dry shrubland below 1200 feet in elevation.

- **SBMR:** The three known populations are known only from the Waiʻanae Mountains. Suitable habitat occurs for this species in the training area.

L. remyi (FSOC/G1). (nehe). This annual herb occurs in wet sites in dry forests of the northern Wai'anae Mountains.

- **DMR:** Suitable habitat exists for this species on DMR.

L. tenuis (FSOC/G2). (nehe). This perennial herb s found only in the central Wai'anae Mountains in moist forests, open streambeds and on slopes.

L. venosa (FE/-). (nehe) This is a somewhat shrubby herbaceous perennial. This plant is found sparsely in dry shrubland on the Island of Hawai'i above 2,200 feet in elevation. It is known from two locations within the Keamuku Parcel on montane dry shrubland dominated by introduced grasses. The major threats to this plant are habitat loss, cattle grazing, and fire.

- **PTA:** It is known from two locations within the West PTA Acquisition Area.

Lobelia gaudichaudii* ssp. *gaudichaudii (FSOC/-) . This plant is an unbranched shrub with woody stems.

- **KTA:** It is known only in the highest elevations of the northern and central Koʻolau Mountains. One quarter of the entire extant population exists within the ROI boundary. It is found in Lehua Maka Noe Bog in KLOA.

L. gaudichaudii* var. *koolauensis (FE/-) . This very rare perennial is found on wet cloudswept slopes associated with ʻōhiʻa lowland wet shrublands. This plant is an unbranched shrub with woody stems.

- **SBMR:** One population exists on the east range on a ridge above South Kaukonahua.

L. niihauensis (FE/G2). This sparingly branched shrub occurs rarely on moist to dry cliffs in the northern Wai'anae Mountains.

L. oahuensis (FE/G1). (Pānaunau). This is an unbranched perennial shrub. The primary threats to L. oahuensis are the introduced plant Koster's curse and feral pigs.

- **SBMR:** Eleven populations of this plant remain in areas of forest that are often exposed to heavy winds and rain. Suitable habitat occurs for this species in the training area.

L. yuccoides (FSOC/G2). (Pānaunau). This unbranched perennial shrub has woody stems and is known from dry ridges in diverse moist forests in the Wai'anae mountains.

Melicope christophersonii, M. cinera (FC/G1). ʻalani is one of the largest flowering plant genera in Hawaiʻi and ranges in size from a tree to a small shrub. It is often found in native-dominated moist forests. Competition with aggressive alien plants and the black twig borer are the primary threats to this plant, but lack of reproductive vigor and feral pigs and goats also affect the species and habitat.

M. hawaiensis (FSOC/G2) (formerly *Pelea hawaiensis*). This tall shrub or tree occurs in dry or sometimes moist forests and is fairly widespread. Though there is low possibility of fires in the forests, wildfire would have a negative impact. Feral pigs, goats, and sheep have not been observed browsing on this species.

- **PTA:** There is habitat for this species on PTA.

M. hiiakae, M. lydgatei (FC/-). This small tree *(Melicope hiiakae)* or shrub *(M. lydgatei)* can be found in native dominated moist forests in the Koʻolau and Waiʻanae mountains. The primary threats to *M. lydgatei* are competition with aggressive alien plants, feral pigs and goats, and low seed production and fewer reproducing plants.

- **KTA:** This small tree *(Melicope hiiakae)* or shrub *(M. lydgatei)* can be found in native dominated moist forests in the Koʻolau and Waiʻanae mountains. Fewer than 45 plants of *M. lydgatei* remain, in the Lower Pe'ahinai'a and the Poamoho Trail area. Six individuals of the very rare *M. hiikae* are also found in the ROI.

Myrsine fosbergii (FC/-). This branched shrub or small tree is known from the Koʻolau Mountains where it is considered uncommon. It generally occurs at elevations exceeding 2,000 feet. *Myrsine* populations in general suffer from habitat degradation from feral pigs and possibly from military activities.

- **KTA:** Habitat for this species exists in the project area, but population data is not known.

Neraudia ovata (FE/G1). This plant occurs as a sprawling shrub in open Metrosideros forest and Myoporum shrublands and is generally found on the leeward side of the Island of Hawaii. Threats to the eleven plants of this species that remain are browsing and associated habitat modifications from sheep and goats (PCSU 2002).

- **PTA:** This plant is found on the western boundary of the installation.

Nototrichium humile (FE/G2). (kuluʻī). This basal-branching perennial shrub flowers heaviest in summer and spring. It is found throughout the Wai'anae Mountain range on windward and leeward sides, on gulch slopes and bottoms, in the understory of dry forests, and on sparsely vegetated dry cliff faces and ledges. This plant is very susceptible to fire damage because its habitat extends to the lower drier reaches of the Wai'anae Mountains. Major threats include feral hoofed animals and associated habitat destruction. Alien grasses that are highly flammable contribute to the habitat degradation and possible wild land fire damage.

- **DMR:** Two populations are documented on DMR: at Kapuni Gulch and in the Kealia land section.

Phlegmariarus nutans (FE/-). There is little life history information available for this clubmoss. It is presently found growing on tree trunks in only three locations in wet Koʻolau forests, where four

individuals remain. Noxious alien plants, localized extinction, and feral pigs are all threats to *P. nutans*. Populations of this species are thought to be underreported because they are small plants.

- **SBMR:** It is known along the Schofield Waikāne Trail and on the SBER training area.
- **KTA:** Three individuals occur in the ROI.

Phyllostegia hirsuta (FE/G1)*; *P. mollis (FE/G1). These erect herbs, vines, or subshrubs occur on steep shaded slopes in forests that are moist to wet. The primary threats to these plants are feral pig habitat destruction, potential impacts from military training, and intense competition with alien plants.

- **SBMR:** One population of *P. hirsuta* is documented on SBER at the South Kaukonahua Gulch. There are two populations of *P. mollis* on SBMR
- **KTA:** Ten individuals of *Phyllostegia hirsuta* occurin the ROI.

Plantago princeps* var. *princeps (FE/-). This is a woody shrub that lives in moist cliff habitat or in rainforest. Known populations in the Waiʻanae Mountains total about 200 plants. Wild pigs, goats, and weeds are responsible for this plant's habitat destruction. Feral pig rooting and habitat degradation and alien plant species competition are the largest threats to populations on wet sites, and goat browsing and alien plant competition are the major threats in dry areas.

- **SBMR:** At least one population exists on the SBMR. It is known from the western portion of the ROI.

Platydesma cornuta* var. *cornuta (FC/G2). This species is a rare palmlike shrub found in moist forests in the Koʻolau Mountains.

- **SBMR:** It is known at Kawailoa.
- **KTA:** Three populations are located in the ROI.

Platydesma cornuta* var. *decurrens (FC/G2). This plant is a rare palm-like shrub found in moist forests in the Koʻolau Mountains, or from the Waiʻanae Mountains.

- **SBMR:** At least one population is on the SBMR, in the western portion of the ROI.

Pleomele forbesii (FC/G1). This tree is can grow to 21 feet tall. It is found in dry and moist forests. This plant is highly threatened by fire and alien plants.

- **SBMR:** One small population is found on the training area.

Portulaca sclerocarpa (FE/G1). This plant is a perennial herb found generally in subalpine woodland, primarily in dry habitats, such as bare cinder or steam vents. Low seed production and fewer reproducing plants is a major threat, and fountain grass is invading this species' habitat.

- **PTA:** There are small populations in the Kīpuka Kalawamauna Endangered Plants Habitat (Shaw 1997) at the western edge of the installation. Low seed production and fewer reproducing plants is a major threat, and fountain grass may be is invading this species' habitat.

Pritchardia kaalae (-/G1). This plant is a rare fan palm reaching up to 33 feet tall and found only in northern portions of the Waiʻanae Mountains. It is found in moist to dry zones on moderately to very steep cliffs.

- **SBMR:** One population of this endangered plant is in the SBMR training area. It occurs at the SBMR west boundary within the Waianae Kai watershed protection area.

Psychotria hexandra* ssp. *oahuensis (FC/G4). This tree or shrub found in moist to wet forests on Oʻahu. It is known only from the Koʻolau Mountains, where there are fewer than 20 plants.

- **KTA:** It is known only from the Koʻolau Mountains, where there are fewer than 20 plants. There is one plant in the ROI.

Pteralyxia macrocarpa (FC/G2). (kaulu). Known only from the 2 mountain ranges on O'ahu, this plant is scattered in valleys and on slopes in moist forests.

- **SBMR:** It is known only from the two mountain ranges on Oʻahu. Suitable habitat occurs for this species in the training area, in the south and west portions of the ROI.

Pteris lidgatei (FE/G1). This is a coarse fern found in lowland wet forests with over 100 inches of rainfall each year. It is commonly found on stream banks and near waterfalls in ʻōhiʻa-dominated forests. Habitat destruction by wild pigs and the alien plant Koster's curse are both reasons for its decline.

- **SBMR:** Four individuals exist along the South Kaukonahua Gulch on the SBER
- **KTA:** Only three populations remain of this plant. Suitable habitat for this species is found in the training areas. Presently it is known from one site in the ROI.

Sanicula purpurea (FE/G1). This perennial herb with thick, underground storage roots grows in moist areas, generally on slopes and in deep soil. Dormant through summer, the plant's new growth appears with the onset of the wet season. Goats are a major threat, mainly because they degrade the slopes where the plants grow and hasten erosion.

- **SBMR:** There is one population of *S. purpurea* on SBER.
- **KTA:** It occurs in open bogs in the Koʻolau Mountains. Fewer than 200 plants of this species exist. Three populations are known in the ROI.

Schiedea hawaiiensis (FSOC/-). This climbing vine grows in dry shrubland and only one individual remains in the wild.

- **PTA:** Only one individual remains in the wild. It is reported on PTA from the western portion of the range within the ROI.

S. hookeri (FE/G1); S. nuttallii (FE/G1). *S. nuttallii* is an erect subshrub in diverse moist forest, scattered through exterior valleys of the Waiʻanae Mountains. *S. hookerii* is found in diverse moist forest in the north and central Waiʻanae Mountains. They often grow alongside koa and ʻōhiʻa. Feral pigs and goats are a major threat, as is the population disturbance associated with these invaders. Alien plants alter the habitat and compete for valuable nutrients and light. The increased incidence of

wildfires is also associated with alien grasses, and snails and slugs destroy seedlings and immature plants.

- **SBMR:** *Schiedea* spp. have been documented on SBMR in South Mohiākea Gulch. *S. hookerii* has been documented in the central and northern waianae mountains, and the western portion of SBMR.

S. kealiae (FE/G1). This species is a subshrub with a sprawling tendency. There remain fewer than 500 of this plant in the wild. It generally grows between 200 and 1,000 feet on dry cliff faces and steep slopes. *S. kealiae* is threatened by competition with alien plants and reduced reproductive vigor due to the small remaining populations. Naturally occurring rockslides and weather are also threats to this plant's continued existence. It is historically known from both the northern and southern Wai'anae Mountains.

- **DMR:** Found in Sapindus forest on steep cliffs, remaining populations are found at Ka'ena Point and on the cliffs above Dillingham Airfield. One population exists on DMR.

Sicyos lanceoloidea (FSOC/G1) ('ānunu). This plant is generally found as a trailing annual.. There are some revisions being made to this genus and S. lanceoloidea is not described in Manual of the Flowering Plants of Hawai'i, the most comprehensive guide to plants in the islands.

- **SBMR:** This species occurs in the western portion of SBMR.

Silene hawaiiensis (FT/G1). This plant is a subshrub with erect stems and is found on moist shrubland scattered on more recent Mauna Kea lava flows.

- **PTA:** It occurs from the northern boundary to Kīpuka 'Alalā on the west side and Pu'u Koli on the east side. It is highly palatable to feral sheep and goats, and feral pigs like the taproot (Shaw 1997 p. 66).

S. lanceolata (FE/G1). This plant is considered to be critically globally imperiled. It is a small sprawling shrub with smooth leaves found in moist shrubland areas. Feral pigs and goats are a major threat to this plant, as is the population disturbance associated with these invaders. It is known to be very palatable to feral sheep and goats (Shaw 1997 p. 70). Alien plants alter the habitat and compete for valuable nutrients and light. Fire has had a negative impact on the populations of *S. lanceolata*, and encroachment of fountain grass further threatens these plants (Shaw 1997 p. 70). The increased incidence of wildfires is also associated with alien grasses.

- **PTA:** It is found in the northwest and western portions of PTA, where critical habitat is proposed.

Solanum incompletum (FE/GH). This plant is a woody shrub that can grow to ten feet and has prominent red prickles. It occurs in diverse, arid to mesic, subalpine forest. The plant is known to fruit in late summer and early fall, though other life history details remain largely unknown. The primary threat to these plants is feral sheep browsing and associated habitat disturbance. They are also threatened by fountain grass encroachment and the increased likelihood of fires associated with this encroachment.

- **PTA:** One population remains on PTA. Critical habitat is proposed on PTA for this species.

S. sandwicense (FE/G1). (pōpolo). This species is a large sprawling shrub found on O'ahu and Kaua'i in moist forests dominated by diverse native species.

Spermolepis hawaiiensis (FE/G1).. This plant is a slender herbaceous annual found in ʻŌhiʻa forests and lowland dry shrubland, and occasionally from cultivated fields at lower elevations. There is little information about the life history of this species. Major threats are habitat degradation by feral goats, competition with alien plants, and fire resulting from military training.

- **PTA:** The three populations on PTA total approximately 500 and are thus far the only known occurrence on the Island of Hawai'i. Critical habitat is proposed for this species on PTA.

Stenogyne angustifolia (FE/G1). This plant is a low-growing perennial vine that is widely distributed throughout vegetation communities. Rooting by feral pigs damages the underground stems, though the plant does not appear to suffer from heavy browsing (Shaw 1997 p. 81).

- **PTA:** It is widely distributed throughout vegetation communities on PTA.. 81). This plant is found in the ROI.

S. kanehoena (FE/G1). (ma'ohi'ohi). This species is a fuzzy, climbing vine.. The last population was known from Pu'u kanehoana in the Wai'anae Mountains on O'ahu in moist forest dominated by diverse native species. This population was found dead in 1997 though isolated individuals may still exist.

S. sherfii (FE/-). This climbing vine was found along the Peahenai'a Trail in the Koʻolau Mountains. This species is no longer known in wild populations.

- **KTA:** It was found along the Peʻahināiʻa Trail in the Koʻolau Mountains. This species is no longer known in wild populations though habitat still exists for it within the ROI.

Tetramolopium arenarium* var. *arenarium (FE/G1). This plant is a small erect shrub thought to be extinct until it was rediscovered in 1997 on PTA. Habitat for this plant is generally in *Dodonaea* mixed shrubland communities. Threats to this plant include habitat invasion by fountain grass, wildfire and dust (Shaw 1997).

- **PTA:** This plant is located within and critical habitat is proposed for it on PTA.

T. consaguinium* ssp. *leptophyllum (FSOC/G1). This plant is an erect shrub widely distributed in communities dominated by *Metrosideros, Dodoanea,* and *Myoporum*. This species is threatened by browsing and impacts from dust (Shaw 1997).

- **PTA:** Populations have been recorded at the southern boundary of the Kīpuka Kalawamauna Endangered Plants Habitat and Kīpuka ʻAlalā. It occurs within the ROI.

T. lepidoptum* spp*. lepidoptum (FE/G1). This erect shrub is known presently from the tops of grassy ridges and cliff faces in moist forest in the Wai'anae Mountains. Alien plants pose a significant threat to the habitat of this species.

Tetraplasandra gymnocarpa (FE/G1). This plant occurs as increasingly rare trees, now found only in the summit areas of the Koʻolau Mountains, in wet to moist forests.

- **SBMR:** One individual exists on SBER in South Kaukonahua Gulch.
- **KTA:** It is now found only in the summit areas of the Koʻolau Mountains . Ten individuals are known from the Paumalū and Kaunala gulch areas of KTA.

Urera kaalae (FE/G1). This rare tree has a rapidly declining population found on gulch slopes.

- **SBMR:** One population of three individuals exists in the southern portion of the training area.

Vigna o-wahuensis (FE/-). (mohihihi). This is a slender twining herb. Very little is known about the life history of this plant. It grows in lowland dry and moist grasslands and shrublands at elevations up to 4,500 feet. It is often found associated with *Sida fallax* (ilima), *Chenopodium* species and *Dubautia menziesii*. Major threats include habitat degradation, alien plant competition, and fire.

- **PTA:** It is present in the West PTA Acquisition Area within the ROI.

Viola chamissoniana* ssp. *chamissoniana (FE/G3). This is a woody shrub found on both the windward and leeward sides of the Waiʻanae Mountains. It is generally found in moist habitats on cliffs and cliff faces with sparse to moderate vegetative cover. It usually grows in association with other natives. Feral pigs and goats are a major threat, as is the population disturbance associated with these invaders. Alien plants alter the habitat and compete for valuable nutrients and light. The increased incidence of wildfires is also associated with alien grasses.

- **SBMR:** Two populations exist in the southern portion of the training area.

Viola kauaensis (FE/-). This plant is a perennial herb from the Koʻolau Mountains. *V. kauaensis* is found in open.

V. oahuensis (FE/G1). This is a small unbranched subshrub found in the wet forests of the Koʻolau Mountains. These small plants occur with other natives on cloudswept summits.

- **SBMR:** There are five individuals along the summit of South Kaukonahua Gulch and Kahana.
- **KTA:** *V. oahuensis* is known from ten sites in the ROI.

Zanthoxylum hawaiiense (FE/G1). These are small to medium trees. Reported collection of this species from Oʻahu and Kauaʻi are erroneous (Wagner et. al. 1999). Major threats to this species are browsing, dust, and alien plant competition.

- **PTA:** This plant is found north of the Bobcat Trail.

Zanthoxylum oahuense (FC/G2). These small trees grow in moist to wet forest in the Koʻolau Mountains.

- **SBMR:** There is one population on the SBMR training along the Schofield-waikane trail in the east range.
- **KTA:** This small tree is found in moist to wet forest in the Koʻolau Mountains. This species is found only on Oʻahu, with about 250 trees island-wide. Ten trees occur in the ROI.

I-1C: SPECIAL STATUS WILDLIFE -– NATURAL HISTORY INFORMATION AND SBCT LOCATION IF KNOWN

Status Key:

FE= **Federally Listed as Endangered (ESA)**
FT= **Federally Listed as Threatened (ESA)**
FSOC= **Federally Listed as a Species of concern**
FC= **Federally Listed as a Candidate species for listing**
SE= **Hawaii state listed as endangered**
SE*= **The state endangered listing refers only to the populations on Oʻahu, Lanaʻi, and Molokaʻi**
G1 = Species critically imperiled globally (typically 1-5 current occurrences)
G2 = Species imperiled globally (typically 6-10 current occurrences)
G3 = Species very rare with restricted range
G4 = Species apparently globally secure
G5 = Species demonstrably globally secure
GH = Species known only from historical occurrences
T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
T2 = Subspecies imperiled globally (typically 6-10 occurrences)
T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).
T4 = Subspecies apparently globally secure
MMPA= Marine Mammal Protection Act regulated

Invertebrates

Achatinella mustelina (FE/SE/G1), A. aperfulva (FE/SE/G1), A. byronii (FE/SE/G1), A. curta (FE/SE/G1), A. decipiens (FE/SE/G1), A. dimorpha (FE/SE/G1), A. leucorraphe (FE/SE/G1), A. pulcherima (FE/SE/G1), A. sowerbyana (FE/SE/G1), A. swifftii (FE/SE/G1) and A. valida (FE/SE/G1). Oʻahu tree snails are also known as pūpū kaniʻoe and are native to Oʻahu.. They live in trees and bushes and feed on fungi found on the surface, primarily that growing on native plants (HINHP 1994). Achatinella snails are active during the night and remain sealed in leaves during the day. This species doesn't reach sexual maturity until it is seven years old, after which time it gives birth to between one and four young a year. The breeding season is not known, but embryos can be found in the adult snail's uterus at any point of the year (HINHP 1994). Although this species is limited to the Waiʻanae Mountains, it is believed to have historically occurred from sea level on Oʻahu's windward coast to the uppermost reaches of the Koʻolau Mountains (HINHP 1994). Some of the greatest threats to this species are introduced plants and animals, habitat degradation, fire, and collection.

- **SBMR:** *A. mustelina* has been recorded at several locations and during multiple surveys at SBMR. It is known from the lowland forest and moist ridges and cliffs at Puʻu Kalena, Puʻu Kamakaliʻi, and Puʻu Hāpapa in the Waiʻanae survey area of SBMR (R. M. Towill Corp. 1997b). This species is found in the Main Post ROI but is unlikely to occur at SBER due to lack of habitat. *A. apexfulva, A. byronii, A. decipiens, A. leucorraphe, A. soerbyana,* and *A. swiftii* were observed along or off the Schofield Waikāne Trail in the Koʻolau survey area of SBER, within the project ROI.
- **KTA:** Oʻahu tree snail has been recorded in surveys in the 1980s in KTA but has not been recorded in the area since then, despite surveys by Hadfield in 1984 and Christensen in 1985 (USARHAW and 25th ID [L] 2001a). *A. curta, A. dimorpha, A. sowerbyana, A. pulcherima, A. valida* could occur in the lowland forest and moist ridges and cliffs of KTA. *A. Pulcherima* has been

recorded at KLOA in the vicinity of the Helemanō drainage (PCSU 2001) and could occur in the ROI.

Amastra cylindrica (FSOC/G1), A. micans (FSOC/G1), A. rubens (FSOC/G1). A. spirizona (FSOC/G1), Laminella sanquinea (FSOC/G1),* and *Leptachatina* sp. *(FSOC/G1), Leptachatina lepida (FSOC). Amastrid land snails are native to the Hawaiian Islands. Amastrid land snails are likely threatened by habitat loss and introduced species that prey on them, compete for resources, and spread disease. The historical distribution of *A. rubens* includes Kaʻala, Kukuiʻula, Mokulēʻia, Mākaha, and Haleʻauʻau within the Waiʻanae Mountains (HINHP 1994b). Little is known about *Letachatina's* habitat preferences, life history, and historical range. Amastrid land snails are likely threatened by habitat loss and introduced predators that compete for resources and spread disease.

- **SBMR:** These species were recorded in the southern portion of the Waiʻanae survey area, between Puʻu Hāpapa and Kaluaa Gulch, confirming them in the SBMR ROI.
- **PTA:** The *Leptachatina lepida* has been observed on PTA in Bobcat and ʻAlalā areas (USARHAW and 25th ID [L] 2001b).

Auriculella ambusta (-/G1), A.* sp. aff. *castanea (-/G1), A.* sp. aff. *perpusilla (-/G1), A. tenella (-/G1) A. perpusilla (FSOC/G1), A. pulchra (FSOC/G1),* and *Partulina dubia (FSOC/G1). Achatinellid land snails are endemic to the Hawaiian Islands. They live in trees and shrubs, primarily on native vegetation (R. M. Towill Corp. 1997b; HINHP 1994b). Current life history information is not well studied or understood for these species. Achatinellid land snails are known to feed on fungi on leaves. Achatinellid land snails are likely threatened by habitat loss and introduced species that prey on them, compete for resources, and spread disease.

- **SBMR:** These species have been observed at the Main Post in the Waiʻanae survey areas (R. M. Towill Corp. 1997b). *A. ambusta, A.* new sp. aff. *castanea*, *A.* new sp. aff. *perpusilla*, and *A. tenella* were observed in several locations during the Waiʻanae survey. *A. ambusta* was observed along Puʻu Break Road, along Mt. Kaʻala Natural Area Reserve and on the Schofield Barracks Forest Reserve. *A.* new sp. aff. *castanea* was detected at the southernmost portion of the Waiʻanae survey area. *A.* new sp. aff. *perpusilla* and *A. tenella* were recorded at the southernmost portion of the Waiʻanae, and *A. tenella* was observed again along the trail on the boundary of Mt. Kaʻala Natural Area Reserve. *Partulina dubia* was also identified during the Waiʻanae survey within the Main Post ROI. Also, *A. perpusilla* and *A. pulchra* were recorded near the Schofield Waikāne Trail on the SBER during the Koʻolau survey (R. M. Towill Corp. 1997b).
- **KTA:** *Auriculella ambusta, A.* sp. aff. *castanea, A.* sp. aff. *perpusilla, Partulina dubia* could occur in the KTA ROI, based on the availability of suitable habitat.**.**

Euconulus (Nesoconulus)* sp. cf. *gaetanoi (FSOC/-). This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has been identified in the PTA ROI (PCSU 2002).

Helicoverpa confusa (FSOC/G1). Hawaiian helicoverpa moth is known to occur in the montane dry forests.

- **PTA:** This species occurs in the ROI (USARHAW and 25th ID [L] 2001b).

Hylaeus unica (FSOC/GH). The unique yellow-faced bee feeds on and provides their larvae with pollen and nectar. Some species in the family specialize in particular flower species, and others have more general preferences and are active only from the morning until the late afternoon (USGS 2001b). Unique yellow-faced bees compete with several alien species. Nonnative ants, wasps, and bees can be active for more hours during the day and have reduced the resources available to native bees, as well as physically excluded native bees from flowers (USGS 2001b).

- **SBMR:** The unique yellow-faced bee was observed in the Waiʻanae survey area, along the Waiʻanae Range on the Schofield Barracks Forest Reserve and to the northeast in Mt. Kaʻala Natural Area Reserve (R. M. Towill Corp. 1997b). This species has been confirmed in the SBMR ROI.

Megalagrion oahuensis (FSOC/G1). The Oʻahu megalagrion damselfly is native to Oʻahu, where it occurs most commonly on the leeward ridge crests. This species eats only other insects and breeds in damp leaf litter beneath fern banks (Polhemus 1997). Major threats to *Megalagrion* species include competition and predation from introduced species, such as fish, frogs and invertebrate species, and physical destruction of habitats.

- **SBMR:** The Oʻahu megalagrion damselfly was found at SBMR on the Schofield Barracks Forest Reserve in the Waiʻanae survey area and was detected in the Mt. Kaʻala Natural Area Reserve (R. M. Towill Corp. 1997b). It has been confirmed in both the SBMR and SBER ROI.
- **DMR:** Its reintroduction to DMR in 1999 was largely unsuccessful, due possibly to the previously undetected presence of crayfish in the DMR Pinaoʻulaʻula Stream (PCSU 2002).

M. xanthomelas (FC/G2). The orange-black megalagrion damselfly is a native to the Hawaiian Islands. It breeds in a wide range of habitats, including coastal wetlands, perennial streams, reservoirs, and ponds (NatureServe 2001). This species is an insectivore (eats only invertebrates) and primarily eats insect larvae. The introduction of nonnative predatory fish poses a major threat to this species.

Nesopupa (Infranesopupa) subcentralis (FSOC/-). This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has been identified in the PTA ROI (PCSU 2002)

Nesovitrea hawaiiensis (FSOC/-). This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has the potential to occur within the ROI.

Philonesia* sp. *(FSOC/-) This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has the potential to occur in the project area (PCSU 2002).

Pleuropoma sandwichiensis (FSOC/G1). The Helicinid land snail is native to the Hawaiian Islands. Historically this species was found in all eight Hawaiian Islands. Helicinid land snails are likely threatened by habitat loss and introduced species that prey on them, compete for resources, and spread disease.

- **SBMR:** Current records document it only at the Waiʻanae Mountains on Oʻahu (R. M. Towill Corp. 1997b; USARHAW and 25th ID [L] 2001a; PCSU 2001). This species was observed at the southern portion of the Waiʻanae survey area (R. M. Towill Corp. 1997b), which is part of the SBMR ROI.

Rhycogonus gifardi (FSOC/G1). Giffard's rhyncogonus weevil is endemic to the Island of Hawaii and is known to inhabit montane dry shrublands dominated by *Dodonaea,* dry to mesic forest, and woodland (25th ID [L] and USARHAW 2001b). The historic distribution of this species is limited to the North Kona District of Hawaiʻi (25th ID [L] and USARHAW 2001b). Giffard's rhyncogonus weevils are herbivores. Weevils are threatened by fire and the resulting loss of habitat and food.

- **PTA:** It is known to inhabit PTA, having been identified in the native shrubland at Kīpuka Kalawamauna in 1998 (HINHP 1998; USARHAW and 25th ID [L] 2001b) and are confirmed in the ROI.

Striatura (Pesudohyalina)* sp. cf. *meniscus (FSOC/-), Striatura* sp. *(FSOC/-) This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** These species have been identified in the PTA ROI (PCSU 2002).

Succinea konaensis (FSOC/-). This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has been identified in the PTA ROI (PCSU 2002).

Vitrina tenella (FSOC/-). This species tend to inhabit areas with vegetation and primarily feed on the bacteria growing on leaves and other vegetation. Threats to this species include habitat destruction and the presence of introduced predatory snails.

- **PTA:** This species has been identified in the PTA ROI (PCSU 2002).

Birds

Anas wyvilliana (FE/SE/G1). Hawaiian duck, also known as koloa maoli was historically known to all major Hawaiian Islands, except for Lanaʻi and Kahoʻolawe. It is now limited to Kauaʻi, Niʻihau, Oʻahu, Maui, and Hawaiʻi. The Hawaiian duck is found on the windward wetland complexes and the north shore (USFWS 1999c). This species' preferred habitat includes lowland marshes, reservoirs, pastures, and wetlands (USFWS 1999c). It nests on the ground, near water in well concealed and protected areas (NatureServe 2001). Food includes green algae, rice, grasses, grass seeds, earthworms, insects, and snails (NatureServe 2001). This species is threatened by the loss of wetland habitat.

Asio flammeus sandwichensis (FSOC+/SE*/G5T3). Pueo, also known as the short-eared owl is believed to be native to the Hawaiian Islands (HINHP 1994a). It is found in a range of habitats, such as pastures, grasslands, dry or wet forests, with either native or nonnative dominated vegetation and up to 7,900 feet above sea level (HINHP 1994a). Pueo feed heavily on introduced mammals, such as house mice and rats. They are active during the day, which is unusual for most owl species. It nests on the ground, usually on grass (HINHP 1994a). Young pueo have been observed in nest from March to November. Threats to this species include habitat loss and introduction of large mammals, such as mongooses, that prey on their eggs.

- **SBMR:** The pueo was observed in the SBMR ROI in the western portion of the Waiʻanae survey area, along the Waiʻanae Range, and on the Schofield Barracks Forest Reserve, in the vicinity of Mohiākea Gulch (R. M. Towill Corp. 1997b). A pueo was observed at the border or SBER within the ROI (PCSU 2001).
- **DMR:** No pueo has been observed on DMR, but there are small portions of suitable habitat present (PCSU 2001), so it could occur in the area.
- **KTA:** Signs of this species at KTA were observed during previous studies (Shallenberger 1977; USARHAW and 25th ID [L] 2001a), and the pueo could occur in several areas of the KTA ROI.
- **PTA:** The pueo was observed in the PTA ROI by a Tetra Tech biologist during a site visit 12/30/02.

Branta sandvicensis (FE/SE/G1). Hawaiian goose, also known as nēnē, had an historical distribution which included lowland habitats that have since been destroyed or inhabited by invasive non-natives that prey on the Hawaiian goose (NatureServe 2001). The Hawaiian goose is known in portions of the Island of Hawaii, Maui, and a lowland area near Lihuʻe, Kauaʻi. It does not require open water and inhabits bare rocks and sparsely vegetated lava flows. The nēnē moves in the summer from barren lava areas to forage on nonnative grass dominated pastures (Virginia Tech 1998; NatureServe 2001). It feeds primarily on berries and native vegetation and nests in areas of low vegetation, along the edges of mesic to wet forest, shrub/scrub, grassland, and rugged lava flows in upland scrub growth (Virginia Tech 1998; 25th ID [L] and USARHAW 2001b). Nesting season is from October to March (NatureServe 2001). This species is threatened by predation by humans and introduced species and habitat loss/degradation.

- **PTA:** The Hawaiian goose has been found in several areas of PTA. Shallenberger in 1977 found droppings in Training Area 1, Training Area 23, and the southwest portion of the impact area. These sightings occurred within the project ROI.

Buteo solitarius (FE/SE/G1). The Hawaiian hawk, also known as ʻio, is endemic to the Island of Hawaii. It inhabits cropland, hedgegrow, hardwood forest, herbaceous grassland, and hardwood woodland (NatureServe 2001). It breeds in the spring, with a peak in April and May (Virginia Tech 1998). It nests in a variety of habitats, from agricultural fields to native and nonnative forests. The Hawaiian hawk is an opportunistic feeder that eats birds, rodents, and insects. The Hawaiian hawk is threatened by the loss of nesting habitat and disruption of nests by human activity, which can easily cause nest abandonment. The USFWS created a recovery plan, which outlines protection and restoration measures necessary for the recovery of this species (USFWS 1984).

- **PTA:** This species has been observed on PTA and was recorded at Training Area 23 in a 1998 survey (USARHAW and 25th ID [L] 2001b). This species was observed during a 1977 and a 1998 survey of PTA (Shallenberger 1977; Schnell et al. 1998) confirming their occurrence in the ROI.

Chasiempis sandwichensis ibidis (FE/SE/G4T1). (Oʻahu ʻelepaio). This bird is native to Oʻahu. This species inhabits native Hawaiian forest but is most common in riparian habitats, in moist forests with tall canopy and an extensive understory (Shallenberger and Vaughn 1978; USFWS 2001a). The ʻelepaio appears to tolerate introduced species and disturbed environments, as demonstrated by its use of such environment. It is estimated however, to inhabit less than eight percent of its former range and is now confined to the Koʻolau and Waiʻanae mountains (Na Manu 2002; USFWS 2001a). It breeds generally from January to June. It nests are built on several types of plants, nonnative as well as native. The ʻelepaio feeds on arthropods, such as insects and spiders. Threats to this species include habitat loss, predation and spread of disease. Nonnative species are believed to be a significant cause of predation to this species and to serve as disease vectors. Critical habitat has been designated for the Oʻahu ʻelepaio (USFWS 2001b).

- **SBMR:** The ʻelepaio was observed during the HINHP survey in the southern portion of the Waiʻanae survey area, near Puʻu Hāpapa at SBER, along the Schofield Waikāne Trail (R. M. Towill Corp. 1997b).
- **DMR:** It has not been observed on DMR, but there is suitable habitat for it (PCSU 2001), so it could occur in the area.
- **KTA:** Shallenberger recorded the Oʻahu ʻelepaio at KTA in a 1977 survey (Shallenberger 1977; PCSU 2001), so it is known to occur in the ROI.

Chasiempis sandwichensis sandwichensis (+/G4). The ʻelepaio is a rare species that is endemic to Hawaiʻi. This species inhabits native and nonnative forest and riparian habitats (NatureServe 2001). Their breeding season generally takes place from February to August. Nests are built in the fork or branches of trees such as the native ʻōhiʻaor the nonnative java plum, fiddlewood and guava at heights of 7 to 52 ft (NatureServe 2001). The ʻelepaio feeds on insects in areas of high foliage density (NatureServe 2001). It is unclear why adult ʻelepaio adults are declining at PTA but further study is recommended and predator control is recommended (PCSU 2002, pg 78).

- **PTA:** This species has been recorded on PTA in the ROI (Gon et al. 1993, Table 10 [T30], Cooper et al. 1996).

Fulica alai (FE/SE/G2). Hawaiian coot, also known as ʻalae keʻokeʻo, was historically found on all of the larger Hawaiian Islands, except for Lanaʻi and Kahoʻolawe. Kahoʻolawe is the only main Hawaiian Island where the coot is not currently found. This species is found most frequently on the

east, west, and north shores of O'ahu, and less frequently at the south shore and interior reservoirs (USFWS 1999c). The coot's preferred habitat is herbaceous wetland, lagoon, river mouth/tidal river, low gradient, pool, and shallow water (NatureServe 2001). The coot feeds on a variety of foods, including seeds, berries, insects, small fish, and leaves (NatureServe 2001). Loss of wetland habitat is considered the greatest threat to this species (USFWS 1999c).

- **DMR:** It could occur in the DMR ROI, based on the presence of suitable foraging habitat in the area.

Gallinula chluoropus sandvicensis (FE/-). Hawaiian moorhen, also known as 'alae'ula, was once commonly found on most of the Hawaiian Islands, except Lana'i and Kaho'olawe (USFWS 1999c). Currently the species is found only on O'ahu and Kaua'i. Moorhens are known to forage at Pearl Harbor in semi-brackish water and in the Lualualei Valley in the leeward side of the island (USFWS 1999c). The moorhen's preferred habitat is freshwater marshes, brackish marshes, waterways, and wetlands. The loss of wetland and marsh habitat is considered a major threat to this species.

- **DMR:** It could occur in the DMR ROI, based on the presence of suitable foraging habitat in the area.

Hemignathus munroi (FE/SE/G1). 'Akiapōlā'au, also known as the honeycreeper, is a Hawaiian endemic species inhabits mesic to wet 'ōhi'a, koa-'ōhi'a, and koa-māmane forests, and dry māmane and māmane-naio forests; it is most common in mesic koa forests and woodlands (Virginia Tech 1998). The species requires native forest or woodland vegetation for cover and shelter (Virginia Tech 1998). Little is known about 'Akiapōlā'au breeding and nesting. One nest site was recorded in an 'ōhi'a tree along a lateral fork 39 feet above ground. 'Akiapōlā'au feeds on invertebrates, especially insects. Threats to this species include loss of nesting and breeding habitat and harassment by humans from shooting and disrupting nesting activity.

- **PTA:** 'Akiapōlā'au has been observed on PTA (USARHAW and 25th ID [L] 2001b), although several surveys found no evidence of the species (Shallenberger 1977; David 1995; Schnell et al. 1999; Gon et al. 1993). In 1995 a lone female was found in Training Area 2 (David 1995). This species could occur in the ROI, based on availability of foraging areas.

Hemignathus virens virens (+/G3). Amakihi is a Hawaiian endemic species that is relatively common to a small portion of the islands. The 'amakihi inhabits native forests and shrublands above 1,640 feet on the Island of Hawaii and Maui (NatureServe 2001). It nests in branches of māmane and naio trees from March through May (NatureServe 2001) and feeds mainly on insects and nectar. It is threatened by loss and degradation of habitat.

- **PTA:** It is a Hawaiian endemic species that is relatively common to a small portion of the islands. This species occurs in the ROI (PCSU 2002).

Himatone sanguinea (+/G4). 'Apanane is the most abundant native bird to the Hawaiian Islands. It is considered an important species because of its native status and the devastation that introduced species have caused to native birds and is federally identified as a bird of conservation concern. The 'apanane is found in moderate to high numbers in Hawai'i, Maui, and O'ahu. This species inhabits the hardwood forest, most commonly in the native and mixed native/nonnative forests in higher elevations in Hawai'i. Nesting season is late fall through summer, and it nests in the tops of 'ōhi'a

trees and treefern fronds in lava tubes (NatureServe 2001). It feeds on insects and nectar. Subspecies have been threatened by habitat loss and degradation caused by introduced species.

- **PTA:** This species occurs in the PTA ROI (PCSU 2002).

- **KTA:** This species has been observed at KTA during Shallenberger's 1977 survey and in the 1989 survey of the estate of James Campbell's Kahuku property (R. M. Towill Corp. 1997b).

Himantopus mexicanus knudseni (FE/G5T2). The Hawaiian stilt, also known as ae'o, were historically found on all of the Hawaiian islands, with the exception of Lana'i, Kaho'olawe, and the Island of Hawaii (USFWS 1999c). This species is currently found on all of the Hawaiian Islands, except for Kaho'olawe. The O'ahu population, which supports the greatest number of stilts in all of the Hawaiian Islands, are primarily found on the north and windward coasts (USFWS 1999c). The preferred nesting habitat is exposed mudflats with low growing vegetation (USFWS 1999c). The stilt forages in shallow water and wetlands, with invertebrates, such as insects, making up most of its prey. The greatest threat to this species is the loss of wetland habitat (USFWS 1999c).

- **DMR:** It is known to DMR in areas potentially affected by the Proposed Action.

Loxoiides bailleui (FE/SE/G1). Palila also known as ou-po'opāpale and po'opāpale, inhabits dense māmane woodlands, sparse māmane woodlands, and to a lesser degree, pasture (USGS2001a and 2001b). Palila is thought to have occurred prehistorically on O'ahu and Kaua'i at low elevations and was historically limited to portions of the Island of Hawaii, where it was found on the slopes of Mauna Kea and parts of Hualalai and Mauna Loa (USGS 2001b and 2001c). It is believed to inhabit less than five percent of its former range (NatureServe 2001; USGS 2001b and c). Nesting has been documented from January to October, with a peak in activity from April through September (USGS 2001 b and 2001c; NatureServe 2001). It nests in September in māmane or naio trees in higher density māmane-dominant forest (USGS 2001b and 2001c; NatureServe 2001). It feeds on māmane and insects. The Palila is sensitive to habitat degradation, particularly the loss of habitat due to fire (NatureServe 2001). It is also threatened by avian diseases and introduced species degradation of habitat and predation.

- **PTA:** Critical habitat has been designated on the Island of Hawai'i in two noncontiguous portions of Mauna Kea, along the northern boundary of PTA (USFWS 1977a and 1977b; USARHAW and 25th ID [L] 2001b). This species is known to occur on PTA along the upper slopes of Mauna Kea. Annual surveys have occurred along federally designated palila critical habitat on PTA (Figure 9.10-5), although no individuals have been identified since 1950 (USARHAW and 25th ID [L] 2001b; Gon et al. 1993). The recorded sighting of the Palila was within the PTA ROI.

Loxops coccineus wolstenholmii (-/G2). O'ahu 'ākepa is native to O'ahu. It generally inhabits montane 'ōhi'a-koa forest above the 3,000 foot level (Na Manu 2002). This species feeds on insects and nectar and often nests in tree cavities. The 'ākepa is threatened by deforestation and habitat degradation, which have caused the introduction of nonnative species. Nonnative species can act as

disease vectors and frequently prey on native species or out-compete them for resources (NatureServe 2001).

- **SBMR:** The ʻākepa was observed in the Koʻolau survey area on SBER, within the ROI.

Myadestes obscurus (+/G4). ʻŌmaʻo is a Hawaiian endemic species that has lost approximately 70 percent of its historic habitat (NatureServe 2001). It primarily inhabits mesic and wet native *(Metrosideros polymorpha)* and mixed ʻōhiʻa and koa *(acacia koa)* forests above 3,300-feet elevation (NatureServe 2001). Nesting activities peak from April to July. The ʻōmaʻo is an opportunistic species that generally feeds on fruit and insects. Although this species appears to be stable, it has had lowered success in the recent past due to habitat loss and introduced species (NatureServe 2001).

- **PTA:** This species could be in the ROI, based on the availability of foraging areas.

Paroreomyza maculata (FE/SE/G1). Oʻahu creeper, also known as ʻalauahio, inhabits hardwood forest, occurring in mixed ʻōhiʻa-koa forest, alongside ridges and valleys (NatureServe 2001). Although the Oʻahu creeper was found in the Waiʻanae and Koʻolau Mountains in the late 19th century (HINHP 1994a), its numbers are so reduced that it is very rarely sighted. Its present distribution cannot be determined. Threats to this species include loss of habitat, through development and conversion of the forest, and introduced species, which prey on or out-compete the creeper or degrade its habitat (NatureServe 2001), through development and conversion of the forest, and introduced species, which prey on or outcompete with the creeper or degrade its habitat (NatureServe 2001).

- **SBMR:** Several Oʻahu creepers were observed along the Waiʻanae survey area, at Mt. Kaʻala Natural Area Reserve, and at Schofield Barracks Forest Reserve, in the vicinity of Mohiākea Gulch. The Oʻahu creeper was observed along the Schofield Waikāne Trail and in the southern portion of the Koʻolau survey area at SBER (R. M. Towill Corp. 1997b). These sightings confirm the presence of this species at both SBMR and SBER.
- **DMR:** It has not been recorded on DMR (PCSU 2001). The Oʻahu creeper is unlikely to occur on the DMR ROI due to lack of suitable habitat.
- **KTA:** This species could occur in the KTA ROI. This species is historically known to occur in the ROI but there have been no confirmed sightings at either location in the last 20 years (PCSU 2001).

Pterodromoa phaeopygia sandwichensis (FE/SE/G1). Hawaiian dark-rumped petrel, also known as ʻuaʻu, is an open ocean species that breeds along barren mountain slopes (NatureServe 2001). Originally it bred at low elevations throughout the Hawaiian Islands, but it presently breeds only in higher elevations (NatureServe 2001) in spring and summer. This species feeds primarily on fish and squid, although the young are also fed crustaceans. It is threatened by human hunting and introduced species, such as the mongoose, which preys on its eggs (USFWS 1983c).

- **PTA:** The dark-rumped petrel is believed to occur on PTA based on sightings of this species nearby and the availability of suitable habitat. A dark-rumped petrel was observed near PTA in a 1995 survey, and an unconfirmed report of a chick was made in 1990 (USARHAW and 25th ID [L] 2001b). These sightings occurred within the project ROI.

Vestiaria coccinea (SE/G4). ʻIʻiwi is an endemic forest bird, found most frequently in the upper canopies of ʻōhiʻa *(Metrosideros)* forest at greater than 2,000 feet (NatureServe 2001). ʻIʻiwi primarily feeds on flower nectar of ohia but can also feed on foliage, insects, and spiders Threats to this species include habitat degradation and competition, predation, and the spread of disease from nonnative species (NatureServe 2001). Its rapid decline in Oahu is likely to have resulted due to a sensitivity to human induced disturbances (Gon et al. 1993, pg. 28).

- **SBMR:** The ʻiʻiwi has been observed at SBMR in the Mt. Kaʻala Natural Area Reserve and Schofield Barracks Forest Reserve and in the northern and central portions of the Koʻolau survey area in at SBER (R. M. Towill Corp. 1997b). This species is confirmed in the SBMR ROI.
- **DMR:** It has not been observed on DMR, which is not believed to have suitable habitat to support the species (PCSU 2001). This species is therefore not expected to occur in the DMR ROI.
- **KTA:** The ʻiʻiwi has never been reported on KTA and is unlikely to occur because there is very little suitable habitat to support it though the species has been observed on neighboring Kawailoa Training Area, which the Drum Road and Helemanō Trail go through, and where suitable habitat is available. The species could occur in the ROI.
- **PTA:** This species occurs in the ROI, and was identified at PTA during a 1992 seabird survey (Gon et al. 1993, Table 10 [T30]).

Terrestrial Mammals

Lasiurus cinereus semotus (FE/SE/G5T2). Hawaiian hoary bat, also known as ʻōpeʻapeʻa, is native to the Hawaiian Islands. This species is associated with native forests but has been observed among nonnative vegetation (USFWS 1999b). The hoary bat roosts in tree foliage; whether it prefers native trees has not been determined. Distribution of hoary bats once included most of Hawaiʻi, Kauaʻi, and Oʻahu (USFWS 1999b; NatureServe 2001). Hoary bats are still considered common to Hawaiʻi, but less so on the windward side (USFWS 1999b), and may be found primarily in the northern forested zone of Kauaʻi (NatureServe 2001). Bats found on Oʻahu and other Hawaiian Islands may be migrant individuals (USFWS 1999b). More surveys are needed to better understand the location of hoary bats on the Hawaiian Islands and to clear up seasonal gaps and contradictory information. Moths and other insects are the main prey of the hoary bat (USFWS 1999b). They frequently feed in clearings, such as fields, although in the fall and winter they have been observed foraging over a saltwater bay (NatureServe 2001). They are assumed to breed in the fall, based on mainland bat species closely related to the hoary bat (USFWS 1998a). Breeding populations are believed to be limited to the Island of Hawai'i and possibly Kauaʻi. Although little scientific information is available to explain the decline in the population of the Hawaiian hoary bat, some potential causes include habitat loss from deforestation, contamination of prey from pesticides, and disturbance from human activities, such as military training. Activities of this kind can disturb roosting and cause the bats to abandon sites.

- **SBMR:** This species was detected on SBMR, in the Waiʻanae survey area. Hawaiian hoary bat is expected to occur at SBMR, based on the presence of suitable habitat. The hoary bat was also recorded near SBER, in the northern portion of the Koʻolau survey area. The Hawaiian hoary bat is confirmed in the SBMR ROI, based on suitable habitat and proximity to recorded sightings.
- **DMR:** Although this species has not been confirmed on DMR, based on habitat requirements there is the potential for its occurrence there (PCSU 2001); therefore, the species could be found in DMR ROI.
- **KTA:** The Hawaiian hoary bat is expected to occur at KTA, based on the presence of suitable habitat (USARHAW and 25th ID [L] 2001a).
- **PTA:** The Hawaiian hoary bat has been recorded at multiple PTA locations, including Bradshaw AAF, which is part of the project ROI (Gon et al. 1993; Cooper et al. 1996).

Fish

Leptipes concolor (-/-/G3). This goby species is endemic to the islands of Hawai'i. The goby's eggs are laid in nests in freshwater streams. Larvae are then carried downstream and into marine habitat. After several months they return to the streams, where they grow to adulthood and reproduce (NatureServe 2002).
There has been a large decline in the Oahu populations, where it is threatened by stream modifications and the introduction of nonnative fish (NatureServe 2002).

- KTA: Leptipes concolor has been recorded within the KTA ROI (Figure 7.10-3?) ((USARHAW and 25th ID [L] 2001a, HINHP 2002).

Balaenoptera acutorostrata (MMPA). Minke whales are infrequently seen as solitary individuals around the northwest islands of Hawai'i, or also on the leeward sides of the islands (ONR 2000). Breeding appears to take place during winter in warmer waters, but little is known of their breeding behaviors in this area. There is little data on stock structure for these species in Hawaiian waters.

- **All Locations:** Minke whales may potentially occur in project area waters year round, most likely incidentally in the channels, on the leeward sides of the islands, or in offshore waters.

B. borealis (FE/MMPA). The IWC considers only one stock of the sei whale to exist in the North Pacific (NMFS 2000d), but some conflicting evidence exists for multiple stocks (Mizroch et al. 1984; Masaki 1977). Sei whales migrate from high latitude summer feeding grounds to lower latitude wintering areas, although little is known about the winter distribution of this species. They tend to move into offshore waters and are rarely seen off coastal areas; they seem to prefer open ocean (NMFS 2000d). There are no abundance estimates for this species in Hawaiian waters.

- **All Locations:** Sei whales are not expected to be found in project area waters.

B. edeni (MMPA). Bryde's whales are occasionally seen in the Hawaiian Islands, particularly in the northwest of the chain (Leatherwood et al. 1982); there was one documented sighting in 1977 near Kaua'i (DeLong and Brownell 1977). In the western North Pacific stock, estimates of the whale's numbers range from 10,000 to 49,000 (ONR 2000). Most likely due to this species' limited migration and confined distribution, the total world population is likely to be relatively small. There is conflicting data on the reproductive and migrating patterns of this species. Bryde's whale is unlikely to occur around the main Hawaiian Islands but is somewhat more commonly sighted by aerial or vessel surveys, or stranded (NMFS 2000g, 2000h). There is no data on stock structure or population numbers for these species.

- **All Locations:** Bryde's whales may potentially occur in project area waters year round, most likely as incidental transients.

B. musculus (FE/MMPA). As with the fin whale, additional evidence of the blue whale comes from acoustic recordings of its vocalizations (Thompson and Friedl 1982; Northrop et al. 1971; McDonald and Fox 1999). The stock structure of this species is uncertain, but the IWC and NMFS consider the North Pacific group to be one stock (NMFS 2000c).

- **All Locations:** This species is not expected to be found in project area waters. Blue whales are considered rare in project area waters, and there is only one published sighting record from 1966 (Berzin and Rovnin 1966) north of the main island chain.

B. physalus (FE/MMPA). The general distribution of fin whales is largely offshore, and abundance estimates indicate that this species is uncommon in the region (Balcomb 1987). Distribution and movement patterns for this species are assumed to consist of seasonal migrations between higher latitudes for foraging and lower latitudes for mating and calving. NMFS considers the fin whale stock found in Hawaiian waters as a separate stock (NMFS 2000b). Fin whales most likely migrate into

Hawaiian waters mainly in the fall and winter (Thompson and Friedl 1982; Northrop et al. 1968; McDonald and Fox 1999), based on acoustic recordings off O'ahu and Midway islands.

- **All Locations:** This species is rarely sighted in project area waters but have been occasionally heard. Their distribution is largely offshore, and abundance estimates indicate that these species are uncommon in the region (Balcomb 1987). A multispecies feeding assemblage of 8 to 12 fin whales was observed in 1987 (Balcomb 1987) approximately 250 miles south of Honolulu. Additional sightings were reported north of O'ahu in May 1976 and in the Kaua'i Channel in February 1979 (Shallenberger 1981). More recently, a single fin whale was observed north of Kaua'i during an aerial survey (Mobley et al. 1996). This species is not expected to be found in project area waters.

Berardius bairdii (MMPA). Baird's beaked whales are found in warm to cold temperate waters of the North Pacific. They have specific centers of abundance, some of which occur along the Emperor Seamounts, northwest of Hawaii. They occur inshore, but usually are found near or seaward of the continental shelf, especially around submarine escarpments and seamounts.

- **All Locations:** Baird's beaked whales may potentially occur in project area waters year round,, most likely as incidental transients.

Delphinus Delphis (MMPA). Common dolphins are pelagic (offshore) animals that eat fish and small squid. They are widely distributed, and tend to occur in tropical waters. They frequently adopt cooperative techniques to capture prey and herds will work together to dive and drive a school of fish to the surface. They are highly vocal animals and tend to occur in large active schools (1000-100,000 or greater in numbers).

- **All Locations:** These animals are less common than either the spinner or spotted dolphin groups and are unlikely in project area waters except as incidental transients.

Eubalaena glacialis (FE/MMPA). The IWC and NMFS consider the North Pacific right whale stock to be one distinct stock (NMFS 2000e). The right whale is typically observed in temperate and subpolar waters.

- **All Locations:** Right whales occur rarely in the Hawaiian Islands area (Herman et al. 1980). A single right whale was observed in 1979 near Maui (ONR 2000) and another in 1996 (NMFS 2000e). This species is rare and is not expected to be found in project area waters.

Globicephala macrorhynchus (MMPA). Pilot whale occurs off the Hawaiian Islands, and the most abundant species is the short-finned pilot whale (NMFS 2000l). This species occurs year-round in Hawaiian waters in herds of 20 to 40 individuals, with aggregations of over 100 occasionally observed (ONR 2000). The stock structure is poorly understood. The Hawaiian population estimates are approximately 1,800 animals (Mobley et al. 2000).

- **All Locations:** These animals are less common than either the spinner or spotted dolphin groups, but are known to pass through project area waters and have the potential to occur year round in all of the coastal waters off the seven islands. They have been confirmed in the DMR and PTA ROIs.

Grampus griseus (MMPA). Risso's dolphins are somewhat uncommon in Hawaiian waters. There have been four recorded strandings on the main seven islands (NMFS 2000u) and one documented group off the Kona Coast of the Island of Hawaii (Balcomb 1987). A recent aerial survey documented a sighting off the leeward side of O'ahu (Mobley et al. 2000).

- **All Locations:** These animals are less common than either the spinner or spotted dolphin groups. They may potentially occur in project area waters year round, most likely as incidental transients.

Kogia breviceps; K. simus (MMPA). The pygmy and dwarf sperm whale species are small, relatively solitary, apparently deep-diving whales that live in temperate to tropical deep waters from 60°N to 40°S around the world. They are especially common along continental shelf breaks. Based on their geographic distribution and the habitat of their preferred prey, both species are likely to be deep divers. Both species have been sighted in project area waters on several occasions over the last 20 years either by aerial or vessel surveys, or as strandings (NMFS 2000g, 2000h). There is no data on stock structure or population numbers for these species.

- **All Locations:** These animals are less common than either the spinner or spotted dolphin groups, but are known to pass through project area waters year round, and have the potential to occur in all of the coastal waters off the seven islands, most likely as incidental transients.

Megaptera novaeangliae (FE/MMPA). The waters off the coast of the project training areas are best known for their seasonal population of humpback whales, which are also the most abundant marine mammal in the project area (Mobley et al. 1999). The Hawaiian Islands serve as an important breeding ground for this species (Calambokidis et al. 1998). The humpback whale is the only one of the five endangered baleen whales that is known to be present historically in reasonably large numbers. The International Whaling Commission (IWC) and NMFS consider there to be three stocks of humpbacks in the North Pacific group, one of which is the Hawaiian population (NMFS 2000a). Humpback whales are found throughout the island chain and are most abundant in coastal waters of the main Hawaiian Islands, including Hawai'i and O'ahu, from November through April, with peak abundance occurring from late February through mid-March (Baker et al. 1981). Approximately two-thirds of the entire North Pacific humpback whale population (approximately 4,000 to 5,000 whales) migrate to Hawaiian waters to breed, calve, and nurse (NMFS 2000a). These whales are generally found in shallow water shoreward of the600-foot depth contour (ONR 2000), although there have been reports of individuals up to 10.8 nautical miles off the west coast of the Island of Hawaii, over bottom depths of 4,593 feet. Cow/calf pairs appear to prefer very shallow water less than 60 feet (ONR 2000; Smultea 1992). Humpback whale (of varying pod sizes and types, including mother and calf pods) are commonly sighted off the O'ahu coast and may be expected in project area waters from late January through early April (Clark and Tyack 1998). Humpback whale mothers and calves prefer the calmer shallower waters often found on the leeward sides of the islands (Smultea 1992), and these pod compositions would be less commonly expected along the north shore of O'ahu. Some results suggest that habitat use patterns of females and calves in nearshore Maui waters might have decreased, perhaps due to increasing vessel and human activities (ONR 2000). Humpback whales are vulnerable to human disturbance in Hawaiian waters and possibly to vessel strikes. Hawai'i regulations prohibit boats from approaching within 100 yards of adult whales and within 300 yards of mother/calf pairs.

- **All Locations:** This species is confirmed in project area waters and is expected to occur consistently from January 1- April 30.

Mesoplodon* and *Ziphius* spp. *(MMPA). Beaked whales, a sub-group of cetaceans, is found year-round in Hawaiian waters. Beaked whale mainly forages offshore in relatively deep water (ONR 2000). Types of beaked whales that may occur include Baird's *(Berardius bairdii),* Blainsville's *(Mesoplodon densirostris),* and Cuvier's *(Ziphius cavirostris).* Distributions and abundances of beaked whale in project area waters are still poorly understood. Cuvier's seems to be the most widely distributed in the main Hawaiian Islands (NMFS 2000m), and recent sighting records indicate this species off both O'ahu and Island of Hawaii shores (Mobley et al. 2000). Baird's beaked whale is considered unlikely to occur in the main Hawaiian Islands, though it has been observed on aerial surveys and vessel surveys (ONR 2000). Blainsville's beaked whale is more common in Hawaiian waters than elsewhere in the North Pacific (NMFS 2000n) but is seen only occasionally, either in deeper offshore waters or off the coast of O'ahu and the Island of Hawaii (Mobley et al. 2000). There is no information on stock structure of these species.

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Monachus schauinslandi (MMPA).. The monk seal is the only pinniped species known to occur in the Hawaiian archipelago. This species occurs only in the Hawaiian Islands, where its greatest distribution and abundance occurs in the small, mostly uninhabited, northwest island chain. These are the islands and atolls stretching 1,100 nautical miles northwest of the main Hawaiian Islands, most of which are included in the Hawaiian National Refuge (NMFS 2000w). Incidental transients are known from all the main seven island chain, and there is a small uncounted population on the island of Ni'ihau (NMFS 2000w). The species is managed as one stock, though each island may in fact have its own subpopulations (NMFS 2000w). This seal tends to stay near land. Virtually nothing is known about the distribution and movement patterns of this species when they are at sea. Hawaiian monk seals have been counted since the late 1950s at the atolls, islands, and reef, where they haul out on the northwest Hawaiian Islands. Current estimates indicate that the monk seal population is declining and is believed to include approximately 1,000 animals. Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes reefs but also are known to use the Midway Islands, among other northwest Hawaiian Islands (NMFS 2000w). The colony on Midway was virtually eliminated by the US Navy, which has used the island since the early 1960s, but current counts suggest that the seals may be reestablishing themselves on Midway as a major breeding site.

- **All Locations:** This species occurs only in the Hawaiian Islands. Incidental transients are known from all the main seven island chain, and there is a small uncounted population on the island of Ni'ihau (NMFS 2000w). This species is expected to occur in project area waters year round in either the DMR or PTA ROI, though incidence would be low.

Orcinus orca (MMPA). The killer whale is found in all the world's oceans, from about 80°N to 77°S but is most common within 430 nautical miles of major continents in cold temperature to subpolar waters (ONR 2000). Killer whales in the Hawaiian archipelago are a distinct stock genetically (NMFS 2000i). Sightings occur anecdotally almost yearly in the main seven Hawaiian islands, but documented sightings are less common. No killer whales were sighted within 25 nautical miles of the

main island chain during a six-year aerial survey study (Mobley et al. 2000), but there have been two documented sightings or strandings in the last few decades (NMFS 2000i). Killer whales are more common in the French Frigate Shoals (NMFS 2000i). Sightings typically consist of small groups or single animals and can occur at any time of year (ONR 2000).

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Peponocephala electra (MMPA). Melon-headed whale is generally distributed from 20°S to 20°N (ONR 2000). It is found in tropical and temperate waters throughout the world and has been commonly sighted off the south and eastern coasts off O'ahu and the north coast of the Island of Hawaii (Mobley et al. 2000; NMFS 2000o). It typically occurs in large pods and could occur in the project area and may be incidentally sighted in waters adjacent to the islands' north shores.

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Physeter macrocephalus (FE/MMPA). The sperm whale is the only toothed whale in the project area. While sperm whales are listed as endangered, but they are considered to be the most abundant of the large whale species, numbering an estimated 1,900,000 animals worldwide (ONR 2000). While deep water is their typical habitat, sperm whale have been occasionally observed in shallower areas. When found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth, where upwelling occurs and biological production is high, implying the presence of a good food supply. Sperm whales have been sighted offshore of all of the main seven islands (NMFS 2000v), and they have been heard off O'ahu year-round (NMFS 2000v). This species has the potential to occur in project area waters. Historically, sperm whaling grounds in the Pacific south of 40°N latitude were around the Hawaiian Islands, among other areas. Sperm whales are considered fairly common around Midway Atoll (ONR 2000). For stock assessment purposes, NMFS recognizes three discrete population centers of sperm whales, one of which is found in Hawai'i (NMFS 2000v). Sperm whales can dive to depths of at least 6,562 feet and can remain submerged for an hour or more. During summer, they migrate to high latitudes, with mature males migrating much farther north than females and younger males. In the Pacific Ocean, females and younger whales usually remain in tropical and temperate waters, while males continue north to the Gulf of Alaska, the Aleutian Islands, and the Bering Sea or south to the Antarctic. Breeding herds are confined almost exclusively to warmer waters, and many of the larger males return to lower latitudes in winter to breed. Sperm whales in the Pacific Ocean during this time are usually distributed below 40°N latitude.

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Pseudorca crassidens (MMPA); Feresa attenuate (MMPA). False killer whale is found occasionally in Hawaiian waters during all seasons (NMFS 2000j). Pygmy killer whale is found less frequently, but when it is sighted it is most commonly off the Island of Hawaii and off O'ahu. Pygmy killer whale also occurs in all Hawaiian waters during all seasons (NMFS 2000k). Both species travel in groups of half a dozen to over several hundred individuals. Population estimates and stock information for both species is poorly understood (NMFS 2000j, 2000k).

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Stenella attenuata (MMPA). Several species of pantropical spotted dolphins occur in Hawaiian waters, the most common of which is *Stenella attenuata* (NMFS 2000s). Spotted dolphins occur in smaller group sizes than spinners and sometimes can intermix in spinner dolphin groups (NMFS 2000s). Spotted dolphins occur both nearshore and offshore (ONR 2000). This species is common and abundant in Hawaiian waters, especially in the channels between the islands and on the leeward sides of the islands (NMFS 2000s). The Hawaiian spotted dolphin is a distinct stock, with a population estimate of approximately 3,000 animals (Mobley et al. 2000). The Hawaiian stock of striped dolphins is a distinct stock (NMFS 2000t), and there have been documented sightings off the leeward side of O'ahu (NMFS 2000t). This animal is less common than either the spinner or spotted dolphin groups but has the potential to occur in all of the waters off the seven islands.

- **All Locations:** This species is confirmed in project area waters and is expected year round in large groups and with regular frequency.

S. longirostris (MMPA). Spinner dolphin is also very common and abundant in Hawaiian waters and can occur in huge groups of over 400 animals (NMFS 2000q). It gathers in large herds at night, offshore and in deep channels between the islands, for feeding. It tends to rest on the leeward sides of the islands. The Hawaiian spinner group is a distinct stock, with a population estimate of approximately 4,000 animals (Mobley et al. 2000). It is common on the leeward sides of both O'ahu and the Island of Hawaii. There is some evidence that there may be a residential population of spinner dolphins off the coast of the Island of Hawaii (NMFS 2000q).

- **All Locations:** This species is confirmed in project area waters and is expected year round in large groups and with regular frequency.

S. coeruleoalba (MMPA). The Hawaiian stock of striped dolphins is also a distinct stock (NMFS 2000t), and there have been documented sightings off the leeward side of O'ahu (NMFS 2000t). These animals are less common than either the spinner or spotted dolphin groups, but have the potential to occur in all of the coastal waters off the seven islands.

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Steno bredanenis (MMPA). Rough-toothed dolphin is relatively common in the vicinity of the Hawaiian Islands in offshore waters, typically occurring over bottom depths greater than 1,640 feet (NMFS 2000r). This species usually travels in groups of three to four, many small groups sometimes using one area. There is no information on stock structure for this species.

- **All Locations:** This species is confirmed in project area waters and is expected to occur in small numbers year round.

Tursiops truncatus (MMPA). Bottlenose dolphin is common both along the coastlines and farther offshore (NMFS 2000p). It is considered to be frequent off all coasts of O'ahu and the Island of Hawaii. The Hawaiian group is a separate stock of bottlenose.

- **All Locations:** This species is confirmed in project area waters and is expected year round in large groups and with regular frequency.

Sea Turtles

Caretta caretta (FT). Loggerheads do not nest in the Hawaiian Islands at all (NMFS 2000bb). Loggerheads occur circumglobally, inhabiting waters off the continental shelf in temperate, subtropical, and tropical waters. Loggerhead sea turtles are rare in Hawaiian nearshore waters (NMFS 2000bb; ONR 2000). They nest in the lower latitudes of the Atlantic coast. Nesting trends for the loggerhead are generally considered to be declining (NMFS 2000bb). Loggerheads take approximately 20 to 30 years to mature, so the suspected decline in immature loggerheads might not be apparent on nesting beaches for decades.

- **All Locations:** This species is uncommon in project area waters.

Chelonia mydas (FT). The most accurate abundance estimates in the project area are for adult female green turtles which nest annually on Hawaiian beaches (NMFS 2000x, 2000y). An estimated 450 to 475 green turtles nest annually in Hawaii (NMFS 2000x). The green sea turtle is considered the most abundant sea turtle in Hawaiian waters, with approximately 1,400 adult females (NMFS 2000x). It is hypothesized that green turtles in the Hawaiian archipelago could be a genetically distinct subpopulation (NMFS 2000x). During the breeding season, adult green sea turtles undertake long-distance oceanic migrations from feeding areas located throughout the Hawaiian archipelago to nesting beaches at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl Reef and Hermes Reef, Kure Atoll, and Midway Island. The nearshore waters of Kaua'i, especially the north shore area, are important habitats for subadult and adult green sea turtles returning from open ocean. Approximately 90 percent of green turtle nesting in the Hawaiian Islands occurs at French Frigate Shoals. Juveniles and subadult green turtles are abundant in the nearshore areas off the Island of Hawaii and O'ahu, as well as off Maui, Kaho'olawe, Moloka'i, Kaua'i, and Ni'ihau (NMFS 2000x). This species is also commonly sighted at Midway Atoll but does not appear to breed there (ONR 2000).

- **All Locations:** The green sea turtle are the most abundant (ONR 2000; NMFS 2000x-z, 2000aa, 2000bb) in project area waters. Green sea turtles may occur in project area waters or on the coastline of the north shore.

Dermochelys coriacea (FE). Leatherbacks do not nest regularly or in great numbers in the Hawaiian Islands (NMFS 2000x, 2000aa). Adult leatherbacks are commonly sighted in the Pacific Ocean near the Hawaiian archipelago, primarily over deep oceanic waters. Leatherbacks do not nest regularly in the Hawaiian Islands. Leatherbacks could occur equally as frequently off any of the main seven islands, but they are often sighted off the north shores of both O'ahu and the Island of Hawaii (NMFS 2000z; ONR 2000).

- **All Locations:** This species is expected in project area waters. They are more typically sighted along the north shore and in offshore waters (NMFS 2000z).

Eretmochelys imbricata (FE). The hawksbill turtle population is very small, with only 12 to 15 nests recorded each year (NMFS 2000y). While all age categories of hawksbills occur in Hawaiian waters, they are considered uncommon; a small number of hawksbills nest on the Island of Hawaii and on Moloka'i each year (NMFS 2000y). Their migration routes are unknown. No hawksbill turtles have been reported in the vicinity of Midway Atoll (ONR 2000).

- **All Locations:** The hawksbill is uncommon in project area waters and is not expected to occur there.

Lepidochelys olivacea (FT). Olive ridleys do not nest regularly or in great numbers in the Hawaiian Islands (NMFS 2000x, 2000aa). Olive ridley sea turtles are not common in Hawaiian waters, although they are the most abundant sea turtle in the eastern Pacific Ocean (NMFS 2000aa). Most records of this species in Hawaiian waters are from entanglements and strandings. There is only one report of a successful nesting in the Hawaiian Islands region, on Maui (NMFS 2000aa).

- **All Locations:** This species is uncommon in project area waters.

I-1D: CRITICAL HABITAT

SBMR

Plant

Proposed Critical habitat designation for plants includes the following species:

- *Abutilon sandwicense;*
- *Alectryon macrococcus;*
- *Chamaesyce rockii;*
- *C. acuminata;*
- *C. koolauensis;*
- *C. st-johnii;*
- *Cyrtandra subumbellata;*
- *Delissea subcordata;*
- *Diellia falcata;*
- *Flueggea neowawraea;*
- *Gardenia mannii;*
- *Hesperomannia arborescens;*
- *Isodendrion laurifolium;*
- *I. longifolium;*
- *Labordia cyrtandrae;*
- *Lepidium arbuscula;*
- *L. lobata* var. *leptophylla;*
- *Lobelia gaudichaudii;*
- *L. oahuensis;*
- *Phlegmariarus nutans;*
- *Phyllostegia hirsuta;*
- *P. mollis;*
- *Pteris lidgatei;*

- *Sanicula purpurea;*
- *Tetraplasandra gymnocarpa;*
- *Tetramolopium lepidotum* ssp. *Lepidotum;*
- *Urea kaalae;*
- *Viola chamissoniana* ssp. *Chamissoniana; and*
- *V. oahuensis.*

Wildlife

The USFWS designated critical habitat for O'ahu 'elepaio on December 10, 2001 (USFWS 2001b) (Figure 5.10-6).

DMR

Critical habitat has been proposed or designated for several species on DMR and includes portions of the installation. USFWS has designated critical habitats for the following species:

Plant

- *Schiedea kealiae,* draft May 2002 (USFWS 2002b).

Wildlife

No federally designated critical habitat exists in the DMR ROI for wildlife.

KTA

Plant

Plants known on KTA with critical habitat proposed by the USFWS are *Cyanea koolauensis, Eugenia koolauensis, Gardenia mannii, Hesperomannia arborescens,* and *Tetraplasandra gymnocarpa.*

Wildlife

No federally designated critical habitat exists in the KTA ROI for wildlife.

PTA

Plant

- *Aspleinum fragile* var. *insulare;*
- *Hedyotis coriacea;*
- *Neraudia ovata;*
- *Portulaca sclerocarpa;*
- *Silene hawaiiensis;*
- *S. lanceolata;*
- *Solanum incompletum;*
- *Spermolepis hawaiiensis;*
- *Tetramolopium arenarium var. arenarium*; and
- *Zanthoxylum hawaiiense.*

Wildlife

The USFWS in 1977 designated almost 109,000 total acres as critical habitat for the palila (*Loxiodes bailleui*) (USFWS 1977a and 1977b) (Figure 9.10-5).